Trend Study 16B-11-02

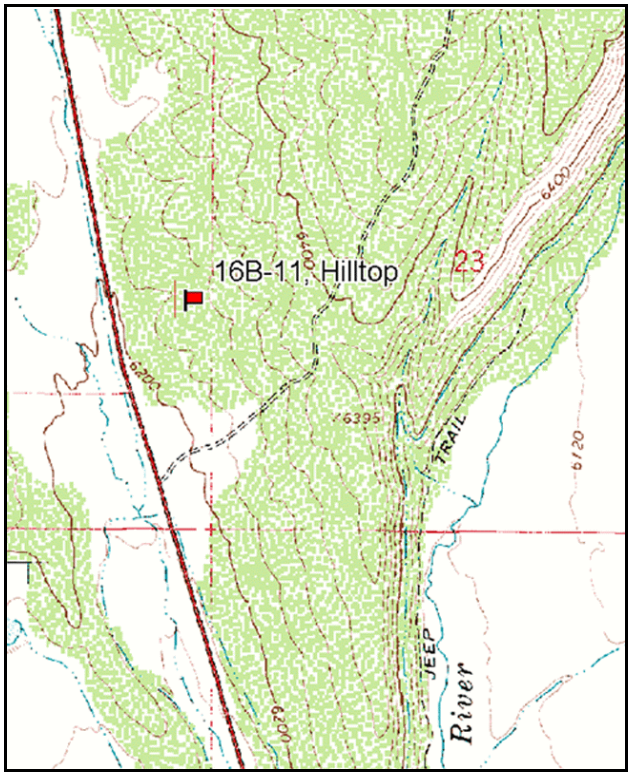
Study site name: Hilltop. Vegetation type: Chained, Seeded P-J.

Compass bearing: frequency baseline 168 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

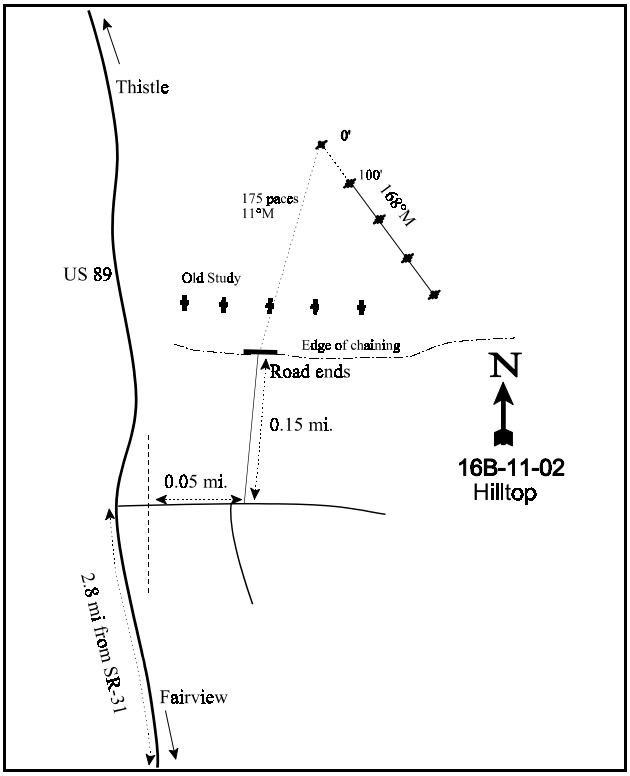
LOCATION DESCRIPTION

From the intersection of US-89 and SR-31 in Fairview, travel north on US-89 for 2.8 miles. Turn right (east) onto DWR property. Pass through a gate and go 0.05 miles to an intersection, turn left (north). Go 0.15 miles to the end of the road. The 0-foot baseline stake, marked by browse tag #439, is 175 paces at an azimuth of 11 degrees magnetic from the end of the road.



Map Name: Fairview

Township 13S, Range 4E, Section 22



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4391415 N 461172 E

DISCUSSION

Hilltop - Trend Study No. 16B-11

This study was established on land formerly owned by the Division of Wildlife Resources, north of Fairview and just east of Highway 89. The area where this study lies was part of a land swap between the Division and a private land owner for property to build the new fish hatchery near Fountain Green. A conservation easement was also part of the property swap which allows grazing for a short time in spring and fall. The study monitors a 250 acre pinyon-juniper chaining treatment that was completed in 1978. The trend study was established in the lower, southern end of the chaining. Slope on the site varies from 5-10% toward the west. Elevation at the study site is 6,200 feet. In 1997, quadrat frequency of deer pellets was 25%, while elk pellet groups were sampled in only one quadrat. In 2002, use by both deer and elk was light. Pellet group transect data collected in 2002 estimated 2 elk days use/acre (5 edu/ha) and 4 deer days use/acre (10 ddu/ha). The sight had been heavily utilized by both cows and sheep before the sight was read in June of 2002. Cattle use was estimated at 19 days use/acre (47 cdu/ha). While sheep use was estimated at 50 days use/acre (123 shu/ha). Livestock use was also noted on the site in 1997.

The soil is moderately deep with an effective rooting depth estimated at nearly 14 inches. Soil depth varies along the baseline with more shallow measurements along the first 200 feet of the baseline (almost 10 inches) and noticeably deeper measurements along the last 200 feet (about 20 inches). Soil texture is a clay loam with a slightly alkaline pH (7.4). Organic matter is relatively high for this unit at 3.9%, second highest measurement in the unit. Phosphorus may be a limiting factor to plant development at only 8.8 ppm, where 10 ppm is considered necessary for normal plant growth and development. There is considerable bare ground on the site (48% in 2002) where erosion is evident with pedestalled bunchgrasses. An erosion condition class assessment indicated that the probability of erosion was moderate in 2002. The ratio of protective ground cover (vegetation, litter, and cryptogams) to bare soil was low in 1997 and 2002 at just over 2:1.

Browse is limited which is probably a main factor why wildlife use is so low. Junipers in the chaining average 8 feet in height and have a density of about 50 trees/acre using point-center quarter data from 1997 and 2002. Average tree diameter is 5 inches. There are also scattered clumps of oak. Mountain big sagebrush is uncommon with an estimated density of 100 plants/acre in 1997, and 40 plants/acre in 2002. Utilization has been mostly light, even with the very low density. It appears that big sagebrush will likely not increase in the near future as no seedling or young plants were sampled in 2002. Establishment of seeded browse appeared to be poor. Mountain big sagebrush and four-wing saltbush were included in the aerial broadcast mix, while cliffrose and bitterbrush were seeded with a dribbler. With the exception of big sagebrush, none of the species that were seeded have been sampled in any year. Elderberry, slenderbush eriogonum, and rubber rabbitbrush occur infrequently on the site.

Seeded perennial grasses are the dominant component in the vegetative community. Crested wheatgrass and intermediate wheatgrass are the primary forage species combining to produce at least 90% of the grass cover. Native grasses are also present, but in very low frequencies. Indian ricegrass and bluebunch wheatgrass were the most common in 1997. The perennial grasses had been heavily utilized by sheep prior to sampling in June of 2002. Sheep had reportedly utilized some of the grasses in 1989 as well. Cheatgrass and Japanese brome are present in the understory, but occur in low numbers and likely will not increase enough to create any problems with fire or competition with perennial species. During the 1997 reading, the Russian wildrye found along the baseline was heavily utilized.

Diversity of forbs is fair, yet none are particularly abundant. Two noxious weeds, musk thistle and morning glory, occur on the site as well. Annual forbs, primarily bur buttercup and pale alyssum, occur in higher frequency than do perennial species. With drought in 2002, sum of nested frequency for perennial species declined by 87%, although they were already in very low numbers.

1989 APPARENT TREND ASSESSMENT

Shrubs have not yet colonized this 10 year old chaining. Objectives for the site include increasing browse densities. With the uneven cover created by the prominent bunchgrasses, there is ample room for seedling establishment. Future readings could help understand the impacts caused by spring sheep use. The vegetative trend appears to be slowly going up. Soil trend appears downward due to the excessive amount of bare soil, soil movement, plant pedestalling and continuing erosion. Increased plant or litter cover would help improve the soil condition.

1997 TREND ASSESSMENT

Trend for soil is down due to an increase in percent bare soil from 27% to 35%, and a decline in litter cover from 46% to 21%. There is a moderate amount of herbaceous vegetation on the site, but localized erosion is ongoing. Trend for browse is down slightly. Browse are lacking and the key species, mountain big sagebrush, shows increased decadence and poor vigor. Rubber rabbitbrush and slenderbush eriogonum also show heavy sheep use. Young plants are present in good numbers but no seedlings of any shrub were encountered during either of the readings. Trend for the herbaceous understory is stable. Sum of nested frequency for perennial grasses declined slightly, while frequency of perennial forbs increased. However, many of the forb species on the site are undesirable weeds and annuals like musk thistle, morning glory, and bur buttercup.

TREND ASSESSMENT
soil - down (1)
browse - down slightly (2)
herbaceous understory - stable (3)

2002 TREND ASSESSMENT

Trend for soil is slightly down. Bare soil increased and vegetation and litter cover are lower. Soil pedestalling is severe, and sheep trails increase erosion potential on the site. Trend for browse is slightly down. Browse is very limited on the site. Sagebrush density declined and there was no recruitment of young plants into the population. A few white-stemmed rubber rabbitbrush and bitterbrush plants observed around the site show heavy use by sheep although neither was sampled on the transect itself. With virtually no reproduction of any palatable browse, this site is losing it's value as critical winter range for big game. The area is already barely being used by big game. The herbaceous understory has a slightly downward trend as well. With drought, perennial grasses and forbs declined in sum of nested frequency. Composition has reached a level where only two species, crested wheatgrass and intermediate wheatgrass, dominate the site.

TREND ASSESSMENT
soil - slightly down (2)
browse - slightly down (2)
herbaceous understory - slightly down (2)

HERBACEOUS TRENDS --
Herd unit 16B, Study no: 11

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'89	'97	'02	'89	'97	'02	'97	'02
G	Agropyron cristatum	203	198	238	76	76	81	11.51	12.36
G	Agropyron intermedium	$_{b}$182	$_{a}$129	$_{a}$107	71	50	37	3.53	3.68
G	Agropyron spicatum	$_{a}$3	$_{b}$40	$_{a}$-	1	16	-	.91	-
G	Bromus japonicus (a)	-	4	-	-	2	-	.01	-
G	Bromus tectorum (a)	-	$_{b}$48	$_{a}$16	-	19	7	.33	.06
G	Elymus junceus	7	-	-	3	-	-	-	-
G	Oryzopsis hymenoides	$_{a}$4	$_{b}$23	$_{a}$5	2	9	2	.40	.15
G	Poa secunda	4	4	-	2	2	-	.01	-
G	Sitanion hystrix	$_{b}$24	$_{a}$8	$_{a}$-	10	3	-	.02	-
Total for Annual Grasses		0	52	16	0	21	7	0.34	0.06
Total for Perennial Grasses		427	402	350	165	156	120	16.39	16.21
Total for Grasses		427	454	366	165	177	127	16.73	16.27
F	Alyssum alyssoides (a)	-	$_{a}$41	$_{b}$71	-	17	30	.40	.17
F	Astragalus convallarius	3	-	-	1	-	-	-	-
F	Astragalus spp.	-	1	-	-	1	-	.00	-
F	Astragalus utahensis	-	4	4	-	2	2	.01	.01
F	Carduus nutans (a)	$_{a}$-	$_{b}$40	$_{a}$-	-	19	-	.44	-
F	Chaenactis douglasii	-	1	-	-	1	-	.00	-
F	Chenopodium fremontii (a)	-	$_{b}$9	$_{a}$-	-	4	-	.04	-
F	Cirsium spp.	-	5	-	-	3	-	.04	-
F	Convolvulus arvensis	$_{a}$-	$_{b}$16	$_{a}$-	-	7	-	.11	-
F	Descurainia pinnata (a)	-	11	-	-	4	-	.04	-
F	Lappula occidentalis (a)	-	3	-	-	3	-	.01	-
F	Medicago sativa	-	3	-	-	1	-	.09	-
F	Phlox hoodii	11	16	5	5	6	2	.25	.18
F	Phlox longifolia	2	4	-	1	2	-	.01	-
F	Ranunculus testiculatus (a)	-	$_{a}$163	$_{b}$196	-	56	65	.97	1.86
F	Sisymbrium altissimum (a)	-	4	-	-	3	-	.04	-
F	Sphaeralcea coccinea	1	4	-	1	2	-	.03	-
F	Taraxacum officinale	-	2	-	-	1	-	.00	-
F	Tragopogon dubius	-	1	-	-	1	-	.00	-
F	Verbascum thapsus	$_{a}$-	$_{b}$11	$_{a}$-	-	5	-	.48	-
F	Viguiera multiflora	-	3	-	-	2	-	.01	-
Total for Annual Forbs		0	271	267	0	106	95	1.96	2.03
Total for Perennial Forbs		17	71	9	8	34	4	1.06	0.19
Total for Forbs		17	342	276	8	140	99	3.02	2.23

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --
Herd unit 16B, Study no: 11

Type	Species	Strip Frequency '97	Strip Frequency '02	Average Cover % '97	Average Cover % '02
B	Artemisia tridentata vaseyana	5	2	.46	.18
B	Chrysothamnus nauseosus albicaulis	2	0	.38	-
B	Chrysothamnus viscidiflorus viscidiflorus	2	2	.15	.15
B	Gutierrezia sarothrae	20	6	.37	.12
B	Juniperus osteosperma	1	0	.63	.15
B	Opuntia spp.	3	2	-	.03
B	Quercus gambelii	1	2	.63	.63
Total for Browse		34	14	2.63	1.27

CANOPY COVER -- LINE INTERCEPT
Herd unit 16B, Study no: 11

Species	Percent Cover '97	Percent Cover '02
Artemisia tridentata vaseyana	-	.42
Chrysothamnus viscidiflorus viscidiflorus	-	.33
Gutierrezia sarothrae	-	.03
Juniperus osteosperma	-	.83
Quercus gambelii	-	1.83

Point-Quarter Tree Data
Herd unit 16B , Study no: 11

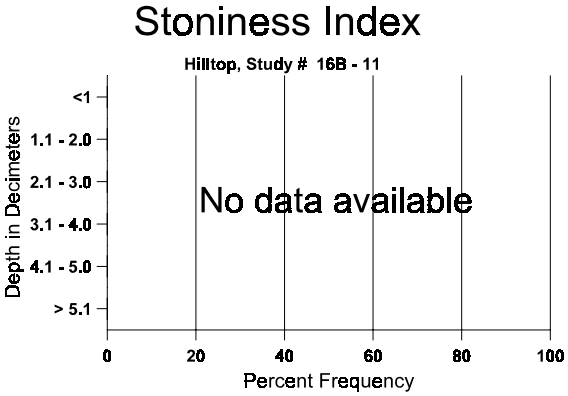
Species	Trees per Acre '97	Trees per Acre '02	Average diameter (in) '97	Average diameter (in) '02
Juniperus osteosperma	47	53	5.0	5.3

BASIC COVER --
Herd unit 16B, Study no: 11

Cover Type	Nested Frequency '97	Nested Frequency '02	Average Cover % '89	Average Cover % '97	Average Cover % '02
Vegetation	336	334	10.50	22.73	19.68
Rock	155	149	4.75	3.01	3.42
Pavement	289	257	11.25	5.28	7.03
Litter	378	369	46.75	20.90	33.79
Cryptogams	8	10	0	.04	.02
Bare Ground	331	344	26.75	35.57	48.51

SOIL ANALYSIS DATA --
Herd Unit 16B, Study no: 11, Hilltop

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
13.8	55.6 (14.3)	7.4	38.7	25.1	36.2	3.9	8.8	134.5	.5



PELLET GROUP FREQUENCY --
Herd unit 16B, Study no: 11

Type	Quadrat Frequency		Pellet Transect	
			Pellet Groups per Acre	Days Use per Acre (ha)
	'97	'02	⁄02	⁄02
Sheep	13	15	653	50 (124)
Rabbit	6	21	-	-
Elk	1	-	26	2 (5)
Deer	25	4	52	4 (10)
Cattle	3	-	226	19 (47)

BROWSE CHARACTERISTICS --
Herd unit 16B, Study no: 11

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
Y	89	-	1	-	-	-	-	-	-	-	1	-	-	-	33			1
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	89	1	6	-	-	-	-	-	-	-	7	-	-	-	233	33	30	7
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40	31	35	2
	02	2	-	-	-	-	-	-	-	-	2	-	-	-	40	26	28	2
D	89	-	1	-	-	-	-	-	-	-	1	-	-	-	33			1
	97	-	1	-	-	-	-	-	-	-	-	-	-	1	20			1
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	89%	00%	00%	-67%
'97	20%	00%	20%	-60%
'02	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'89	299	Dec:		11%
'97	100			20%
'02	40			0%

Chrysothamnus nauseosus albicaulis																		
Y	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	1	-	-	-	-	-	-	-	1	-	-	-	20			1
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	89	-	1	-	-	-	-	-	-	-	1	-	-	-	33	47	91	1
	97	-	-	1	-	-	-	-	-	-	1	-	-	-	20	20	34	1
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0	5	8	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	100%	00%	00%	+18%
'97	50%	50%	00%	
'02	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'89	33	Dec:		-
'97	40			-
'02	0			-

Chrysothamnus viscidiflorus viscidiflorus																		
M	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	4	-	-	-	-	-	-	-	-	4	-	-	-	80	7	9	4
	02	10	-	-	-	-	-	-	-	-	10	-	-	-	200	5	11	10

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	00%	00%	00%	
'97	00%	00%	00%	+60%
'02	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'89	0	Dec:		-
'97	80			-
'02	200			-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Eriogonum microthecum																		
M	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	4	8	0
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0	7	11	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	00%	00%	00%	
'97	00%	00%	00%	
'02	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'89	0	Dec:	-
	'97	0		-
	'02	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Gutierrezia sarothrae																		
Y	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	9	-	-	-	-	-	-	-	-	9	-	-	-	180			9
	02	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	89	4	-	-	-	-	-	-	-	-	4	-	-	-	133	7	10	4
	97	26	-	-	-	-	-	-	-	-	26	-	-	-	520	10	12	26
	02	1	3	2	-	-	-	-	-	-	6	-	-	-	120	4	7	6
D	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
	02	1	-	1	-	-	-	-	-	-	2	-	-	-	40			2
X	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	00%	00%	00%	+82%
'97	00%	00%	03%	-72%
'02	30%	30%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'89	133	Dec:	0%
	'97	720		3%
	'02	200		20%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Juniperus osteosperma																		
M	89	1	-	-	-	-	-	-	-	-	1	-	-	-	33	69	35	1
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
X	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	00%	00%	00%	-39%
'97	00%	00%	00%	
'02	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'89	33	Dec:	-
	'97	20		-
	'02	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Opuntia spp.																		
M	89	1	-	-	-	-	-	-	-	-	1	-	-	-	33	7	20	1
	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60	6	19	3
	02	2	-	-	-	-	-	-	-	-	2	-	-	-	40	4	9	2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	00%	00%	00%	+45%
'97	00%	00%	00%	-33%
'02	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'89	33	Dec:		-
'97	60			-
'02	40			-

Quercus gambelii																		
Y	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40	98	47	2
	02	5	-	-	-	-	-	-	-	-	5	-	-	-	100	6	3	5
X	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	00%	00%	00%	
'97	00%	00%	00%	+20%
'02	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'89	0	Dec:		-
'97	80			-
'02	100			-

Sambucus cerulea																		
M	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	119	98	0
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	00%	00%	00%	
'97	00%	00%	00%	
'02	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'89	0	Dec:		-
'97	0			-
'02	0			-